The financial effects of investing with social criteria: evidence from Europe

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Universidade do Minho
Escola de Economia e Gestão

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STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

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Resumo

O principal objetivo desta dissertação é avaliar o desempenho de carteiras de investimento de ações Europeias formadas com base em critérios sociais (no sentido restrito), no sentido de se perceber o impacto financeiro de investir com critérios sociais.

O estudo abrange 990 empresas europeias que têm a classificação do pilar Social medido pela Thomson Reuters Refinitiv ESG Score entre os anos de 2010 e 2020. As carteiras de investimento foram formadas anualmente utilizando uma abordagem positiva, com base na classificação social de cada empresa. Foram selecionadas as 30% melhores empresas para as carteiras de investimento de topo, e as 30% piores empresas para a carteira de investimento de baixa classificação, na base das quais foram formadas carteiras *value weighted* e *equally weighted.* Como *benchmark* do mercado, foram usados o índice MSCI Europa, usado como referência do mercado geral e o FTSE EUROTOP 100, composto pelas 100 empresas mais capitalizadas da Europa. Os modelos utilizados para avaliar o desempenho das carteiras de investimento foram o modelo de quatro fatores de Carhart (1997) e o modelo de cinco fatores de Fama and French (2015), na sua versão original e na sua versão condicional, na linha de Christopherson *et al.* (1998). Para estudar a robustez dos resultados, foi estudada a aplicação de carteiras de investimento com 10% e 20% das empresas. Foi também avaliado o desempenho das carteiras no período de recessão que se seguiu à crise do Covid-19.

Os resultados mostram alguma evidência de rendibilidades anormais resultantes da construção de carteiras de investimento com base em critérios sociais. Os resultados mostram que o desempenho das carteiras é, genericamente, resiliente à recessão pós-Covid.

Palavras-Chave

Carteiras de investimento ponderadas, Classificação ESG, Classificação social, Investimento socialmente responsável, performance ESG

ABSTRACT

The main purpose of this dissertation is to evaluate the performance of European-based portfolios formed on the Social pillar (in the strict sense) in order to assess the financial impact of investing with social criteria.

The study covers 990 European companies that are rated by Thomson Reuters Refinitiv ESG from 2010 to 2020. Portfolios are formed annually using the positive approach, by ranking the company according to its scores and selecting the best 30% companies to the top-rated portfolio and the 30% worst to the low-rated portfolio. Both equally weighted and value weighted portfolios were formed. Two indices are used as benchmarks: The MSCI Europe Index is the general benchmark, and the FTSE EUROTOP 100 is composed by the 100 most highly capitalised companies in Europe. The models used to evaluate portfolio performance are the Carhart (1997) four-factor model and the Fama and French (2015) five-factor model, both in the original specification and in the conditional specification (as in Christopherson *et al.,* 1998). For robustness purposes, different cut-offs (10% and 20%) were used to form portfolios. Furthermore, this research addresses portfolio performance in times of the Covid recession.

The results showed some evidence abnormal returns from portfolios formed on social criteria. The results also show that portfolio performance is resilient to the crisis period associated to the recession that followed the Covid-19 pandemic.

KEYWORDS

ESG Score; Socially Responsible Investment; Social score; Weighted portfolio; ESG performance.

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1. Introduction

Social issues are one of the trendy topics in investments nowadays, and society is putting pressure on companies to behave in more socially responsible way and to integrate corporate social responsibility (CSR) into their strategy (Helmig *et al.*, 2016). Likewise, this attitude also extends to investors, who aim not only financial objectives but also non-financial objectives when deciding where to invest their money. Socially Responsible Investment (SRI) is a strategy that considers not only financial attributes of investments but also non-financial issues such as environmental, social, and governance (ESG) considerations. Recently, an increasing number of investors pursuit to redirect their savings into companies that integrate high standards on ESG issues. The rise of sustainable development is a daily concern in firms' policy. Currently, there is an effort from companies to keep relatively high environmental standards and adjust production potentials and technologies. Businesses depend on natural and human resources; thus, they should take responsibilities for the consequences of their operations and make contributions to the communities in which they operate (Wisuttisak & Wisuttisak, 2016).

According to Benson and Humphrey (2008), SRI investors are less concerned about returns than conventional investors and their investments reflect both financial and non-financial utility. In fact, a stream of the literature using experiment and survey data documents the role of investors' social preferences when investing (e.g., Riedl & Smeets, 2017, Rossi *et al.*, 2019; Lagerkvist *et al.*, 2020; Anderson & Robinson, 2021; Bauer *et al.*, 2021). Governments and policymakers are also realizing the importance of CSR and are implementing regulations and promulgating laws to instil and incentive the companies' socially responsible behaviour, and there are many intergovernmental initiatives designed to promote investing with sustainability principles.[1] In financial markets, the development of SRI indices and the emergence of many data providers on ESG scores represents a response to the increasing demand of investors for information on corporate behaviour. In turn, companies, in the various sectors, are aware of a vast series of key performance indicators related to sustainability that improve their attractiveness to investors. As a consequence, it is noticed that companies are investing in their social responsibility.

[1] For instance, the United Nations Principles for Responsible Investing (UNPRI), established in 2006, are intended to promote the integration of ESG issues in the investment process. Furthermore, the 2015 Paris Agreement and the Sustainable Development Goals sponsored by the United Nations, are also examples of initiatives of the international community to promote a sustainable world. It is also worth mentioning that the European commission has set an ambitious action plan to connect finance with sustainability.

According to Gillan *et al.* (2021), in 2011, less than 20% of S&P 500 firms released sustainability or corporate responsibility reports, while in 2018, 86% of the companies issued these reports. In addition, assets under the management of investors that have signed onto the Principles of Responsible Investment has increased from $6,500 million in 2006 to $86,000 million in 2019 (Gillan *et al.,* 2021). As of 2020, sustainable assets under professional management represent more than one third of professionally assets managed worldwide (GSIA, 2021).

Following the interest in SRI, the debate on the effects of investing with social screens is a hot topic in the literature. On one hand, the traditional view of Friedman (2007) claims that any corporate social responsibility (CSR) practices are associated with costs that will penalize financial performance. On the other hand, authors like McWilliams *et al.* (2016), in line with Stakeholder theory (Freeman, 1984) defend that investment in CSR results in sustainable competitive advantage of the firm. From the investor's point of view, there are also arguments in favour of a negative and positive effects of investing with social screens. Although SRI may limit diversification benefits, it is argued that using social screens can help identifying companies with better management (Cortez *et al.*, 2009).

An extensive literature examines the financial effects of SRI by forming portfolios based on sustainability criteria and evaluating their performance (e.g., Kempf & Ostoff, 2007, Statman & Glushkov, 2009). However, there are fewer studies that address portfolios formed based on the social dimension (strictly speaking). The purpose of this study is to investigate whether a high score in the social pillar of portfolio's holdings is related to a better financial performance of the investment. In particular, this research will evaluate the performance of portfolios of European firms formed on the social criteria. Furthermore, this study aims to address the effects of investing with social criteria in periods of crisis associated to the Covid-19 recession. In periods of economic recession, it is anticipated that companies will suffer from sales contraction and that will lead to a possible financial problem. However, it is argued that crisis have less impact in the market value of companies with high level of social scores (Lins *et al.* 2017). Consistent with this conclusion, Jones *et al.* (2000) and Schnietz and Epstein (2005) claim that companies with higher levels of CSR perform better in times of crisis due to their higher reputation.

The social pillar is the focus of this work since more than ever, the society is giving importance to matters such as employment equality and gender diversity, animal testing, supply chain transparency, privacy issues and human rights (Waas, 2021). All these subjects are in the international agenda and measures have been addressed to step forward in this direction like the General Data Protection Regulation (also known as GRPD) and the parity laws that are being implemented worldwide to establish gender quotas in public companies Furthermore, although several studies address this issue for US firms, such as Edmans (2011) who form portfolios of the best companies to work for, and Derwall *et al.* (2011), who form portfolios of companies with strong employee relations, there is scarce evidence for the European market.

2. Literature review

2.1 Corporate social responsibility and financial performance

The pros and cons of corporate social responsibility have been debated for a long time. In the decades of 1950 and 1960, voices against CSR emerged. One of the first voices against this principle was Leavitt (1958), a Harvard Business School professor, that published a paper named "The dangers of social-responsibility". In this paper, the professor mention that corporate welfare only makes sense if it makes sense from a financial point of view. Friedman (1962) was other voice against CSR. In his opinion, the acceptance of social responsibility by corporate officials is basically a subversive doctrine, as the manager's only responsibility should be the maximization of shareholders' wealth. Friedman (1970) further reinforces his point of view according to which companies cannot have responsibility, only people can, and businessman's responsibility is to perform as the employers want him to. Friedman (1970) ultimately accepts that an employee may wish to invest in social matters but only to follow its beliefs, never with the intention to maximize the company's profit. Freeman (1984) gave an import step forward in the CSR literature with his stakeholder theory, where he argues that in order to increase company's value and their productivity, they should consider the interest of all stakeholders and not only serves shareholders' interest.

The seminal work of Moskowitz (1972) goes back to almost five decades ago. His findings that there is a positive relationship between corporate social and financial performance was followed by many other studies in the next five decades, with mixed results. For instance, Vance (1975) ranked companies according to their degree of social responsibility and finds a negative correlation between financial performance and corporate social responsibility was observed. Arlow and Gannon (1982) conclude that there was no link between the economic performance of a company and its positive or negative position towards social responsibility. McGuire *et al.* (1988) believes that firms were approaching the concept a wrong way since the performance was measured using the same indicators throughout every industry. Anyhow, given the impossibility of discussing the numerous empirical studies on the relationship between corporate social and financial performance,[2] it is important to point out several review studies, such as Margolis *et al.* (2009), Lu *et al.* (2014) and Friede *et al.* (2015) who, in general, conclude that most

[2] Friede *et al.* (2015) for instance, report more than 2000 papers published on this topic.

studies tend to show a non-negative or positive relationship between corporate social responsibility and financial performance.

2.2 The financial effects of investing with social criteria

From the investors' point of view, there are arguments that support a negative and a positive impact of including social screens in the investment decision. The underperformance hypothesis is largely supported by modern portfolio theory, according to which using any type of screens (of a social nature or not) will penalize portfolio diversification and, as a consequence, portfolio performance. Furthermore, the investing with social screens will increase search and information costs, which will also contribute to a lower performance. Furthermore, another argument in favour of the underperformance hypothesis posits that with high ESG levels are less exposed to risk and thereby have lower expected returns (*e.g.,* Hong & Kacperczyk, 2009). Finally, a stream of the literature focuses on the price effects of investors' tastes for to explain the lower expected of sustainability assets. For instance, Pástor *et al.* (2021) explain that if a group of investors enjoys holding specific assets and refuses holding to hold other assets, these shunned assets will have higher returns.

The main argument that supports the outperformance hypothesis is that social screens enable investors to select companies with high quality of management (Waddock & Graves, 1997). An additional argument is that companies with higher levels of CSR are less likely exposed to several types of risks, such as regulatory risks, than can result in higher costs (such as fines). that engage in sustainable energy strategies are less likely to be exposed to several climate-related risks that can translate into high costs. It can also be argued that CSR is as a viable strategy to improve companies' internal environment, since the company develops capabilities that improve the corporate culture and employees' motivation and commitment. This can influence costs for recruitment and the training of the new employees. Several studies address the effects of good social practices on firm valuation and there is evidence of a positive relationship between corporate social and financial performance. Roberts and Dowling (2002) focus on the reputation as a competitive sustainable advantage. However, it is recognized that measuring the effects of corporate social practices is difficult (Derwall *et al.,* 2011). For instance, Ohlson (1995, 2001) conclude that accounting information is not satisfactory to explain the market value of the company. Bowerman and Sharma (2016) report that the financial and sustainable information of the company should explain the market valuations. Xu *et al.* (2016) conclude that investors see sustainability measures from the companies as positive and an opportunity to improve their returns.

Two seminal papers within the stream of the SRI literature that addresses the performance of portfolios formed on ESG characteristics are Kempf and Osthoff (2007) and Statman and Glushkov (2009). Kempf and Osthoff (2007) find that investors can earn abnormal returns from a strategy involving a long position in portfolios of US firms with high socially responsible levels and a short position in portfolios of firms with low levels of social responsibility. Furthermore, the authors document that the abnormal performance highest when the best-in-class screening strategy is used. Statman and Glushkov (2009) find high socially rated portfolios of US firms perform better than conventional portfolios, although this advantage does not hold when shunned stocks are excluded.

There are fewer papers that form portfolios based on the 'S' dimension of ESG or, more specifically, on scores of employee relations scores. Edmans (2011) analyses the performance of portfolios of stocks of companies with good labour relations (those that belong to the '100 best companies to work for in America'. Their results show that high levels of employee satisfaction can generate superior long-term returns. Carvalho and Areal (2016) further claim that companies that invest on their human resources management derive intrinsic value that was not fully demonstrated in the companies' market value. They analyse the performance of the 'best companies to work for in America' in different market states – crisis and non-crisis - and show these companies are 'resilient' in tough times.

Derwall *et al*. (2011) also analyse the performance of a portfolio of companies that perform well in terms of labour relations. Unlike Edmans (2011) and Carvalho and Areal (2016), Derwall *et al*. (2011) do not rely on the '100 best companies to work for" list. Instead, they measure social performance by using the employee-relations scores of companies provided by KLD. Derwall *et al*. (2011) provide evidence of abnormal returns of the portfolio of companies with strong employee relations, consistent with the errors-in-expectations hypothesis. According to this hypothesis, socially responsible portfolios can generate abnormal returns if the market systematically fails to correctly value the positive effects of CSR in firm value. However, the authors observe that the abnormal returns tend to disappear over time, consistent with market participants learning how to assess value-relevant CSR information. While the errors-in-expectation hypothesis assumes the existence of profit-driven socially responsible investors, Derwall *et al* (2011) also assume the existence of values-driven investors, who are socially responsible investors more concerned with their personal ethical values than financial concerns. The existence of these investors sustains the shunned-stock hypothesis, according to which stocks that are shunned by ethical investors provide abnormal returns. Considering that the personal values of these investors are unlikely to disappear over time, one would expect that the combination of the errors-in-expectations and the shunned-stock hypotheses results in decreasing abnormal returns over time. Another way to look at the evolution of SRI over time is to observe whether there are different patterns of return in crisis vs non-crisis periods. As previously mentioned, Carvalho and Areal (2016) address this issue and find that a portfolio of good labour relations companies performs well in bear markets. Although there are several studies addressing this issue for SRI funds (e.g., Areal *et al.,* 2013, Nofsinger and Varma, 2014; Muñoz *et al.* 2014, Silva and Cortez, 2016) the question remains overlooked in the literature for SRI synthetic portfolios. Regarding this matter, the covid-19 crisis presents a challenge. There are already several recent studies, namely on SRI funds (e.g., Pástor and Vorsatz, 2020; Ferriani and Natoli, 2020) that seem to suggest the performance of these funds has been resilient to the major economic crisis that followed the Covid-19 pandemic, but I am not aware of studies focusing on the effects of the crisis on portfolios formed on social criteria strictly speaking.

This dissertation aims to explore this issue for the European market, by evaluating the financial performance of portfolios formed based on the 'S' dimension of ESG scores.

3. 3. METHODOLOGY

3.1 Portfolio formation

The portfolio formation will follow the positive approach, as in Kempf and Osthoff (2007). The positive screening policy does not imply the exclusion of companies in controversial business areas, but rather rank the companies based on a criterion such as the ESG Social score, used in this study.

Based on the social rating of the Thomson Reuters ESG Scores in year t-1, two portfolios are formed at the year t, and these portfolios will be held for the next 12 months. Initially, portfolios will be formed using a b 30% cut-off rate and, accordingly, a high and low-rated portfolio will be formed comprising the top 30% and bottom 30% of firms, respectively. At the end of the 12 months, the portfolios will be rebalanced, based on the social score of year t. The high and low-rated portfolios are formed on the same criterion. This procedure is repeated every year during the period of analysis. To check for robustness, different cut-offs will be used later, specifically 20% and 10%. It is important to note that Kempf and Osthoff (2007) also assumed different cut-offs for robustness purposes.

The returns of the portfolios were calculated using two different weighting schemes: the value weighted portfolio, in which each stock is weighted by its market value; and the equally weighted portfolio, in which each stock is given the same weight.

The equally weighted portfolio returns were calculated using this formula:

$$R_{pt} = \frac{\sum_{i=1}^{n} R_{it}}{n} \qquad (1)$$

Where, R_{pt} is the return on the portfolio *p* in time *t*; R_{it} is the return of firm *i* in time *t* and n the number of firms in the portfolio.

The value weighted returns were calculated using the following formula:

$$R_{pt} = \sum_{i=1}^{n} R_{it} \left(\frac{V_i}{\sum_{i=1}^{n} V_i}\right) \qquad (2)$$

Where, V_i is the market capitalization of firm *i* in time *t*.

3.2 Unconditional models of performance evaluation

After forming the portfolios, it is necessary to assess their performance. To evaluate the performance of these portfolios, two multi-factor models are used: the four-factor model (Carhart 1997) and the five-factor model (Fama and French, 2015).

The Carhart (1997) four-factor model is widely used in portfolio performance research (Kempf & Osthoff, 2007, and Silva & Cortez, 2016). The three-factor model introduced by Fama and French (1993) was updated by Carhart (1997) by adding the momentum factor to the original specification that already incorporated the market risk, the size and the value versus growth effects:

$$r_{p,t} = \alpha_p + \beta_{p1}(r_{m,t}) + \beta_{p2}(SMB_t) + \beta_{p3}(HML_t) + \beta_{p4}(MOM_t) + \varepsilon_{p,t} \quad (3)$$

Where $r_{p,t}$ is the excess return of portfolio p in the period t, α_t is the abnormal return of portfolio p; $r_{f,t}$ is the risk-free rate in period t; $r_{m,t}$ the excess return on the market portfolio in period t; SMB_t (Small Minus Big) is difference in returns between a portfolio of small and large companies (by market capitalization) in period t; HML_t (High Minus Low) is the difference in returns between a portfolio of high book-to-market stocks and low book-to-market stocks; MOM_t is the difference in the returns of a portfolio of past winners and a portfolio of past losers in period t; and $\varepsilon_{\mathrm{p,t}}$ is the residual of portfolio p in the period t, the β_{p1}, β_{p2}, β_{p3} and β_{p4} represent the coefficient of each risk factor.

The analysis will also include the five-factor model, which involves the integration of two more variables in the three-factor model by Fama and French (2015). The two added factors were proposed to fill an insufficiency in the previous model that did not explain the variation of returns in relation to profitability and investment. The five-factor model is expressed by the following equation:

$$r_{p,t} = \alpha_p + \beta_{p1}(r_{m,t}) + \beta_{p2}(SMB_t) + \beta_{p3}(HML_t) + \beta_{p4}(RMW_t) + \beta_{p5}(CMA_t) + \varepsilon_{p,t} \quad (4)$$

Where RMW_t (Robust Minus Weak) is the difference between the returns on portfolios with robust and weak profitability in period t; and CMA_t (Conservative Minus Aggressive) is the difference between the returns of portfolios of low and high investment firms in period t.

3.3 Conditional models of financial performance evaluation

The evaluation of financial performance using conditional models is considered to provide more robust conclusions than unconditional models, since it incorporates information on economic conditions. (Silva & Cortez, 2016)

The conditional model was first presented in a single-factor specification by Ferson and Schadt (1996), where only the betas were allowed to vary over time based on public information variables, used to predict returns at time t. The model was limited and could be classified as partial conditional since alfas were assumed as constant. Christopherson *et al.* (1998) introduced an improvement in the model that allows for time-varying alphas and betas.

This study will use the previous unconditional models complemented by the conditional model for comparison purposes. Combining the conditional model from Christopherson *et al.* (1998) and the Carhart (1997) four-factor model, the specification of the model will be as follows:

$$r_{p,t} = \alpha_p + A'_p Z_{t-1} + \beta_{p1}(r_{m,t}) + \beta'_{p1}(Z_{t-1} r_{m,t}) + \beta_{p2}\,(SMB_t) + \beta'_{p2}\,(Z_{t-1} SMB_t) + \beta_{p3}\,(HML_t) + \beta'_{p3}\,(Z_{t-1} HML_t) + \beta_{p4}\,(MOM_t) + \beta_{p4}\,(Z_{t-1} MOM_t) + \varepsilon_{p,t} \quad (5)$$

The five-factor model adapted to the conditional specification, will be used as follows:

$$r_{p,t} = \alpha_p + A'_p Z_{t-1} + \beta_{p1}(r_{m,t}) + \beta'_{p1}(Z_{t-1} r_{m,t}) + \beta_{p2}\,(SMB_t) + \beta'_{p2}\,(Z_{t-1} SMB_t) + \beta_{p3}\,(HML_t) + \beta'_{p3}\,(Z_{t-1} HML_t) + \beta_{p4}\,(RMW_t) + \beta_{p4}\,(Z_{t-1} RMW_t) + \beta_{p5}\,(CMA_t) + \beta_{p5}\,(Z_{t-1} CMA_t) + \varepsilon_{p,t} \quad (6)$$

The public information variable will be stochastically detrended, as recommended by Ferson *et al.* (2003), which consists in subtracting their 12-month moving average. Moreover, according to Bernhardt and Jung (1979), the variables will be used in their corresponding zero mean values in order to mitigate the possible scale effects.

3.4 Portfolio performance in the Covid-19 crisis

An additional goal of this dissertation is to analyze the performance of portfolios formed on social criteria in the recession period that followed the Covid-19 pandemic. To distinguish performance in different states of the market, a dummy variable will be added to the four-factor model, as in Areal *et al.* (2013) and Cortez and Silva (2016). This results into the following expression:

$$r_{p,t} = \alpha_p + \alpha_{pD} + \beta_{\mathrm{p1}}(r_{m,t}) + \beta_{\mathrm{1c}}(r_{m,t})D_c + \beta_2\,(SMB_t) + \beta_{\mathrm{2c}}\,(SMB_t)D_c + \beta_3\,(HML_t) + \beta_{\mathrm{3c}}\,(HML_t)D_c + \beta_4\,(MOM_t) + \beta_{\mathrm{4c}}\,(MOM_t)D_c + \varepsilon_{p,t} \quad (7)$$

Where D_c represents a dummy variable that assumes a value of 1 in a crisis period and the value of 0 in a non-crisis period.

The Newey and West (1987) procedure will be applied in the standard errors to correct them for heteroskedasticity and autocorrelation.

4. DATA DESCRIPTION

In this section the dataset used in the formation of the portfolios will be presented, followed by the data retrieved from the Professors Kenneth French's website to be used in the four and five-factor models. The public information variables to be used in the conditional models will also be described.

The ESG score from DataStream is a measure to assess a company without looking at its balance sheet but by understanding how the company impacts the broader society. The ESG aggregate score from Thomson Reuters ESG Refinitiv assesses how well companies compare to their peers in terms of performance in these three main aspects: Environmental, Social and Governance. The Environmental component measures how efficient companies are at managing their resources and looking after the environment that surrounds them. This category mainly considers the resource use, emissions and innovation. The Social component measures how well the company treats their clients, their workers and also diversity aspects around management of the workforce. The categories included in this component are the workforce, the human rights, community, and product responsibility. The Governance dimension seeks to understand if the structure is transparent and independent. There are over 450 ESG measures and the database is updated in a continuous basis. The ratings are expressed in both percentages and grades as letters from D- to A+.

The dataset of this study includes European stocks from companies that are assessed by the Thomson Reuters ESG Refinitiv Scores. As mentioned previously, this research focuses on the 'S' of ESG score. The respect for fundamental human rights conventions, providing job satisfaction in a safe and healthy environment, maintaining the diversity and equal opportunities given to the workforce, the commitment of the companies to protect public health and respecting business ethics, the capacity of a company to produce services and goods with quality and respecting the safety, healthy, integrity and data privacy of the society, are matters in strict scrutinous by the public opinion. Since the performance of all these aspects is measured by the social pillar of the ESG, this is the object of study in this dissertation.

After identifying all European companies with Social ratings from Thomson Reuters ESG Refinitiv, the corresponding monthly total return series and market value were retrieved from DataStream. Both monthly total returns and market value were collected in euros. The final dataset includes 990 companies. The dataset is comprised of end of month observations since June 2011 until May 2021. The collected data starts in June to have a more updated analysis. The ESG score data was retrieved annually from May 2010 to May 2020. The period under analysis includes a major recession that followed the outbreak of the Covid-19 pandemic, that is considered by the European Central bank to start in April 2020. At the time of the last observation of the data set (May 2021) the crisis has not been overcome. This period of crisis is due to the pandemic that is affecting all countries and it delivered the largest shock to the European economy since the Second World war, according to the European Central Bank[3]. In the model with a dummy, the crisis period corresponds to the recession from April 2020 onwards.

To avoid survivorship bias, both active and dead companies were included in the dataset. In Table 1, is the nations from where the companies are. More than a half of the firms are from United Kingdom, Germany and France.

Table 1 - Number of companies by country

Nation	Nº Companies
United Kingdom	330
Germany	100
France	96
Sweden	58
Switzerland	58
Italy	49
Spain	46
Netherlands	38
Poland	34
Turkey	28
Belgium	27
Finland	24
Norway	23
Denmark	22
Greece	18
Austria	13
Ireland	9
Portugal	9
Czech Republic	5
Hungary	3

This table provides the number of companies in the dataset, by country.

Table 2 and Table 3 present the descriptive statistics of the Social ESG Score for the high and low-rated portfolios formed on the 30% cut-off. It is noticeable that this score has increase since 2010, reflecting an increasing relevance of social issues. The number of companies assessed was also increasing until 2017-18, where it stabilized. The mean improves in both tables but, in the low-rated portfolio, the improvement is of 85%. The maximum follows the same direction and improves almost 60%, signs of the investment of the companies in the social matter. Relatively to the skewness, the high-rated

[3] https://www.ecb.europa.eu/press/blog/date/2020/html/ecb.blog200723~c06fafabb6.en.html

portfolio has it positive, meaning that the curve is on the right side and in the low-rated on the left side, as expected. The Excess kurtosis is negative in both scenarios and the normality is rejected by the Jarque-Bera test.

Table 2 – Descriptive statistics of social scores: top-rated portfolios

Year	N	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque Bera Test	*p-value*
2010-2011	229	79.188	97.470	65.630	8.257	0.081	-1.018	11.381	0.003
2011-2012	240	79.628	98.470	66.410	7.990	0.188	-0.941	10.271	0.006
2012-2013	245	79.478	97.870	66.370	7.704	0.233	-0.909	10.643	0.005
2013-2014	249	79.879	97.990	67.120	7.872	0.283	-0.927	12.251	0.002
2014-2015	257	81.314	98.630	69.550	7.153	0.314	-0.762	10.440	0.005
2015-2016	289	82.954	97.980	70.920	7.249	0.170	-0.950	12.258	0.002
2016-2017	298	83.953	98.630	72.510	7.010	0.138	-0.100	13.320	0.001
2017-2018	313	84.621	97.530	74.330	6.686	0.178	-1.190	20.108	0.000
2018-2019	313	85.501	97.090	75.890	5.927	0.156	-1.082	16.547	0.000
2019-2020	310	86.621	97.170	78.030	5.311	0.208	-1.056	16.631	0.000

This table provides descriptive statistics of the social component of the ESG annual rating of the companies that form the high-rated portfolio with a positive screening and 30% cut-off. The observation period is between May 2010 and May 2020. P-value is the probability of an overall combined test statistic of a test for normality based on skewness and on kurtosis.

Table 3 - Descriptive statistics of social scores: high-rated portfolios

Year	N	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque Bera Test	*p-value*
2010-2011	229	20.307	33.870	1.550	8.626	-0.338	-0.833	10.988	0.004
2011-2012	240	20.330	34.030	0.870	8.997	-0.418	-0.826	13.820	0.001
2012-2013	245	22.212	36.690	1.300	9.639	-0.339	-0.866	12.341	0.002
2013-2014	249	23.404	37.560	0.430	9.918	-0.437	-0.779	14.200	0.001
2014-2015	257	23.862	39.140	1.160	10.430	-0.465	-0.757	15.376	0.000
2015-2016	289	25.143	40.020	0.630	10.295	-0.608	-0.540	21.234	0.000
2016-2017	298	27.859	43.770	0.600	11.364	-0.609	-0.546	22.094	0.000
2017-2018	313	30.434	46.520	0.650	11.830	-0.615	-0.523	23.317	0.000
2018-2019	313	32.989	48.830	0.660	11.764	-0.688	-0.335	26.130	0.000
2019-2020	310	37.643	53.910	1.050	12.037	-0.725	-0.137	27.419	0.000

Notes: This table provides descriptive statistics of the social component of ESG annual rating of the companies that form the low-rated portfolio with a positive screening and 30% cut-off. The observation period is between May 2010 and May 2020. P-value is the probability of an overall combined test statistic of a test for normality based on skewness and on kurtosis.

The benchmarks used were the Morgan Stanley Capital International (MSCI) Europe Index (as in Cortez *et al.*, 2009) obtained from DataStream, and the FTSE EUROTOP 100 Index, also retrieved from DataStream. The MSCI Europe Index is the general benchmark and the FTSE EUROTOP 100 is composed by the 100 most highly capitalised blue chip (well-known, well-established, and well-capitalised) companies in Europe.

The risk-free rate corresponds to the 1-month Euribor rate, obtained from the European Central Bank (ECB)[4]. The other risk factors used in the regression models, SMB, HML, MOM, RMW and MOM, were collected from the Professor Kenneth French's website[5].

Following Silva and Cortez (2016), in what concerns public information variables, two variables are used: a short-term rate and a dividend yield of a market index. The short-term rate is the 3-month Euribor rate retrieved from the ECB[6] and the dividend yield is represented by the dividend yield of the STOXX Europe 600 index obtained from Thomson Reuters DataStream.

Table 4 presents the descriptive statistics of the portfolios and risk factors, used in this study

The average excess return is positive for the portfolios, benchmarks, and risk factors. When comparing the equally weighted portfolios, the excess return of both portfolios is similar. Yet, in the value weighted case, the low-rated portfolios have a higher value than the high-rated portfolio. The standard deviation is similar between equally and value weighted, meaning that the risk is similar.

The benchmarks have a similar standard deviation, but the FTSE has a higher value when concerning the average excess return. Both portfolios and benchmarks have a negative skewness, which means that the left tale is greater than the right tail. On contrary, the risk factors have a positive skewness. Only the equally weighted portfolios show a kurtosis greater than 3, so they can be classified as leptokurtic. Regarding the normality test, only the FTSE benchmark does not reject the null hypothesis of normality at the level of 5%.

[4] https://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=143.FM.M.U2.EUR.RT.MM.EURIBOR1MD_.HSTA

[5] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

[6] https://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=143.FM.M.U2.EUR.RT.MM.EURIBOR3MD_.HSTA

Table 4 – Descriptive statistics of portfolios (30% cut-off), and risk factors

Name	N	Avg. Excess Return(%)	Std. Dev. (%)	Maximum	Minimum	Skewness	Kurtosis	Jarque-Bera Test	*p-value*
EQ HIGH-RATED	120	0.982	5.216	0.232	-0.207	-0.367	4.453	101.830	0.000
EQ LOW-RATED	120	0.989	5.273	0.194	-0.221	-0.622	3.808	80.257	0.000
VAL HIGH-RATED	120	1.284	4.540	0.186	-0.157	-0.359	2.621	36.935	0.000
VAL LOW-RATED	120	1.581	4.402	0.161	-0.140	-0.437	1.962	23.066	0.000
MSCI EURO INDEX	120	0.805	4.007	0.145	-0.138	-0.517	1.891	28.559	0.000
FTSE EURO INDEX	120	0.641	3.930	0.146	-0.123	-0.003	-0.097	0.047	0.977
SMB 3 FACTOR)	120	1.505	1.127	0.055	-0.011	0.891	1.592	28.559	0.000
HML (3 FACTOR)	120	1.963	1.413	0.067	-0.012	0.707	0.655	12.133	0.002
MOM	120	1.378	0.958	0.044	-0.008	0.588	0.195	7.095	0.029
RMW	120	1.125	0.997	0.049	-0.009	1.108	2.184	48.397	0.000
CMA	120	2.423	2.006	0.089	-0.013	1.381	2.051	59.160	0.000
SMB (5 FACTOR)	120	1.473	1.112	0.055	-0.012	0.989	2.050	40.556	0.000
HML (5 FACTOR)	120	1.963	1.413	0.067	-0.012	0.707	0.655	12.133	0.000

This table provides descriptive statistics for both equally and value weighted portfolios with high and low-rated portfolios, market benchmarks and the additional risk factors. Average excess return, maximum, minimum, standard deviation, skewness, kurtosis, Jarque-Bera test and its p-value for the period between June 2011 and May 2021.

5. EMPIRICAL RESULTS

This section presents and analyses the empirical results from the regression models implemented. It starts by applying the unconditional models used and then, the conditional models will be used. Finally, some robustness tests are presented, namely in relation to using different cut-offs to form portfolios.

5.1 Unconditional Models

The first model that will be analysed is the Carhart (1997) four-factor model. The corresponding results using the MSCI Europe Index are presented in Table 5. Concerning alpha, which represents the abnormal returns, both the high-rated and low-rated portfolios present neutral returns. Regarding the difference portfolio, the alpha of the equally weighted difference portfolio is positive and statistically significant, indicating that the high-rated portfolio performs better than the low-rated portfolio. However, if the portfolio is constructed on a value weighted basis, the alpha of the difference portfolio is not statistically significant. These results suggest that the better performance of the high-rated equally weighted portfolio is driven by the performance of smaller companies.

Table 6 presents the regressions when using the FTSE EUROTOP 100 Index portfolio. When looking at Table 6, the alpha is positive and statistically significant at the 10% level in the high-rated portfolio with a value weighted basis. The abnormal return of the difference portfolio using the equally weighted method is positive and statistically significant. This conclusion is reached when using both benchmarks, so there is strong evidence that the high-rated portfolio performs better than the low-rated portfolio when using the equally weighted scheme. The adjusted R^2 value of the value weighted high-rated portfolio is 0.938 which implies confidence in these results.

Regarding the market factor, all portfolios represented on Table 5 and Table 6, except for the difference portfolios, have a positive and statistically significant coefficient at the 1% level, meaning that all portfolios are exposed to this factor. In Table 6, the difference portfolio presents a positive and statistically significant value, which leads to the conclusion that the high-rated portfolio, when constructed using the value weighted method, is more exposed to this factor than the low-rated portfolio.

Table 5 - Unconditional Carhart (1997) four-factor model (30% cut-off) - MSCI Europe Index

	Equally Weighted			**Value Weighted**		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.001	-0.004	0.005**	0.002	0.000	0.002
β_P	1.224***	1.178***	0.046	1.084***	1.010***	0.074
β_{SMB}	0.126	0.460***	-0.334**	0.072	0.394***	-0.322**
β_{HML}	-0.050	-0.025	-0.025	-0.005	0.009	-0.093
β_{MOM}	-0.108	-0.092	-0.016	0.009	-0.023	0.032
Adj.R^2	0.922	0.835	0.044	0.953	0.885	0.053

This table provides results for the Carhart (1997) four-factor model with a 30% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; HML – return difference between a high and a low boot-to-market portfolio; and MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Regarding the size factor (SMB), the positive and statistically significant coefficient in all low-rated portfolio, indicates that low-rated companies are more exposed to small companies. Furthermore, the results of the difference portfolio indicate that low-rated portfolios are significantly more exposed to this factor that high-rated portfolios. In what concerns the book-to-market factor (HML), there is no statistically significant coefficient reported in either table, so portfolios are neutral to this risk factor. The momentum (MOM) risk factor is also not statistically significant for neither portfolio. Nevertheless, it is negative in most of them, which hints that these companies tend towards companies with poor performance in the recent past.

Table 6 - Unconditional Carhart (1997) four-factor model (30% cut-off) - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.003	-0.002	0.005**	0.004*	0.002	0.002
β_P	1.216***	1.143***	0.073	1.095***	0.991***	0.104*
β_{SMB}	0.164	0.492**	-0.328**	0.107	0.423**	-0.315**
β_{HML}	-0.023	0.004	-0.027	0.017	0.112	-0.095
β_{MOM}	-0.183	-0.167	-0.016	-0.056	-0.086	0.030
Adj. R^2	0.877	0.758	0.066	0.938	0.820	0.086

This table provides results for the Carhart (1997) four-factor model with a 30% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; HML – return difference between a high and a low boot-to-market portfolio; and MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 7 presents the results of the five-factor model using the MSCI Europe Index as benchmark and Table 8 presents the results of this model when using the FTSE EUROP 100 Index as benchmark.

The alphas on these two tables show that in both indexes the equally weighted portfolio scheme results in lower alphas when compared to the value weighted scheme. In Table 8, the alpha is even positive and statistically significant at a 5% level, indicating an outperformance of this portfolio relative to the FTSE EUROTOP 100 Index. The adjusted R^2 is higher in the high-rated portfolios, with a value of 0.954 in the model with the statistically significant alpha, supporting the arguments to the conclusion of better performance by the high-rated portfolio.

Regarding the market factor, all portfolios represented on Table 7 and Table 8, except for the difference portfolios, have positive and statistically significant coefficients at the 1% level, meaning that all portfolios are significantly exposed to this factor. As previously noticed when using the FTSE EUROTOP 100 Index, the difference portfolio presents a positive and statistically significant value, which leads to the same conclusion that high-rated portfolios, when constructed using the value weighted method, are more exposed to this factor than low-rated ones.

Table 7 - Unconditional Fama and French (2015) five-factor model (30% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	-0.003	-0.005	0.002	0.001	0.000	0.001
β_P	1.231***	1.179***	0.052	1.084***	1.009***	0.075
β_{SMB}	0.113	0.329*	-0.215**	0.069	0.248**	-0.180
β_{HML}	-0.187	-0.086	-0.101	-0.061	0.248	-0.069
β_{RMW}	0.161	-0.129	0.290	0.037	-0.009	0.128
β_{CMA}	0.156	0.331	-0.175	0.174	0.425***	-0.252
Adj. R^2	0.921	0.834	0.039	0.954	0.888	0.042

This table provides results for the unconditional Fama and French (2015) five-factor model with a 30% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; RMW - profitability and CMA – Investment, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Regarding the size factor (SMB), the positive and statistically significant value in the results presented in Table 7 for the low-rated portfolio indicates that the low-rated portfolio is more exposed to small companies. This conclusion is not the same when looking at the Table 8 since there is no statistically significant value regarding the risk factor when comparing to the index. Nevertheless, in the difference equally weighted portfolio, it is demonstrated the same conclusion as in Table 7 in the sense that low-rated portfolios are more exposed to small companies. Regarding the book-to-market factor (HML), there is no statistically significant coefficient, meaning that there is no evidence of portfolios being more exposed to either high or low book-to-market firms.

Analysing the new parameters added with the Fama and French (2015) five-factor model, there is no evidence regarding the profitability constraint, meaning there is no indication of these portfolios being more exposed to companies with robust or weak profitability. In relation to the investment risk (CMA), most portfolios have a positive and statistically significant coefficient on this factor, meaning that they are more exposed to companies with a conservative investment policy than to companies with a more aggressive investment strategy.

Table 8 - Unconditional Fama and French (2015) five-factor model (30% cut-off) - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.001	-0.001	0.002	0.004**	0.003	0.001
β_P	1.220***	1.144***	0.076	1.095***	0.990***	0.105*
β_{SMB}	0.012	0.228	-0.216**	-0.017	0.164	-0.181
β_{HML}	-0.124	-0.022	-0.102	-0.009	0.061	-0.070
β_{RMW}	-0.146	-0.430	0.283	-0.229	-0.346	0.116
β_{CMA}	0.374**	0.539**	-0.165	0.366**	0.604***	-0.238
Adj. R^2	0.874	0.757	0.062	0.941	0.826	0.074

This table provides results for the unconditional Fama and French (2015) five-factor model with a 30% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; RMW - profitability and CMA – Investment, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

5.2 Conditional Models

This subsection, presents the results of the conditional models of Christopherson *et al.* (1998), using the risk-factors of the Carhart (1997) four-factor model and the Fama and French (2015) five-factor model.

Table 9 presents the results of the conditional Carhart (1997) model using the MSCI Europe Index as the market factor. Table 10 presents the results using the FTSE EUROTOP 100 Index instead.

Concerning the abnormal returns, Table 9 reinforces the idea got from the unconditional model that there is statistically significant evidence that when portfolios are created based in an equally weighted method, the high-rated portfolio performs better than the low-rated portfolio (at the 10% significance level). In Table 10, comparing equally weighted portfolios, there is evidence that not only the high-rated portfolio outperforms the low-rated one, but it also performs better than the market index. Regarding the value weighted portfolios, in Table 9 although the alphas are positive, they are not statistically significant. In Table 10, there is statistically evidence that supports the conclusion that both high and low-rated portfolios outperform the market index.

Table 9 - Conditional Carhart (1997) four-factor model (30% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.002	-0.001	0.003*	0.002	0.003	-0.001
α_{ST}	-0.027*	-0.040***	0.013	0.007	-0.005	0.012
α_{DY}	0.006	0.003	0.003	-0.008*	-0.007	-0.001
β_P	1.186***	1.155***	0.030	1.081***	1.013***	0.068
β_{ST*mkt}	0.143	0.128	0.016	0.008	0.007	0.001
β_{DYmkt}	0.405***	0.326	0.079	0.088*	0.119	-0.031
β_{SMB}	0.240***	0.467***	-0.023**	0.070	0.335***	-0.264**
β_{ST*SMB}	0.960**	0.960**	0.000	0.534	0.081	0.453
β_{DY*SMB}	-0.279	0.458*	-0.737***	0.225	0.581**	-0.356
β_{HML}	-0.130	-0.141	0.011	-0.015	-0.012	-0.003
β_{ST*HML}	-0.050	0.644	-0.694*	-0.661*	0.652	-1.313***
β_{DY*HML}	-0.108	0.297	-0.404	-0.029	0.487	-0.512*
β_{MOM}	-0.120	-0.105	-0.015	0.015	-0.043	0.057
β_{STMOM}	0.312	0.122	0.190	0.148	-0.422	0.570**
β_{DY*MOM}	0.216	-0.417	0.633***	0.239*	-0.206	0.445**
ω_1	0.274	0.346	0.766	0.373	0.740	0.825
ω_2	0.007	0.038	0.063	0.332	0.095	0.086
ω_3	0.003	0.022	0.098	0.386	0.055	0.069
$AdjR^2$	0.933	0.851	0.096	0.953	0.893	0.115

This table provides results for the conditional Carhart (1997) four-factor model with a 30% cut-off, using the MSCI Europe index as proxy of the market factor. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), and momentum (MOM), the conditional betas $(\beta_{ST*mkt}), (\beta_{DY*mkt}), (\beta_{ST*SMB}), (\beta_{DY*SMB}), (\beta_{ST*HML}), (\beta_{DY*HML}), (\beta_{ST*MOM}), (\beta_{DY*MOM})$ and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%

Regarding the time-varying alphas, the alpha associated with the short-term rate is, in both high and low-rated equally weighted portfolios, negative and statistically significant, meaning that when experiencing higher values of short-term rate, the portfolios show a lower performance compared to the MSCI Europe Index. In general, all portfolios perform worse when the short-term rate is high. Concerning the alpha associated with the dividend yield, in both Tables 9 and 10, the values are not statistically significant. Looking at Table 9, there is evidence that high-rated portfolios formed with the value weighted method underperforms when there is a high value of dividend yield. However, most portfolios present a neutral influence on this matter.

Regarding the market factor, all portfolios represented on Table 7 and Table 8, except for the difference portfolios and the low-rated portfolio on Table 10, have a positive and statistically significant coefficient at the 1% level, meaning that all portfolios are significantly exposed to this factor. In the value -weighted difference portfolio associated to the FTSE EUROTOP 100 Index, the difference portfolio presents a positive and statistically significant market beta coefficient, which leads to the conclusion that the high-rated value-weighted portfolios more exposed to this factor than the low-rated one.

Concerning the size factor (SMB), most portfolios present a statistically significant positive coefficient, meaning that the portfolios are more exposed to small-cap stocks. A positive value associated with the dividend yield means that when the dividend yield presents high values, the portfolios would be more exposed to small-cap stocks too, whereas a negative value would represent a high exposure to big-cap stocks. The same logical can be used when approaching the coefficients related to the short-term rate.

Regarding the book-to-market factor (HML), there is no statistically significant coefficient, meaning that there is no evidence portfolios being more exposed to either high or low book-to-market firms. Nevertheless, concerning the conditional coefficient of the dividend yield, is possible to infer that low-rated portfolios are more exposed to growth stocks than high-rated portfolios, when the dividend yield is higher. Concerning the short-term rate, in value-weighted portfolios there is evidence that high-rated portfolios are more exposed to low book-to-market firms than low-rated portfolios in times of higher short-term rates.

In relation to the momentum (MOM), only in Table 10 there is a statistically significant value in the equally weighted portfolios. The negative statistically significant value means that the high-rated portfolio is more exposed to companies that recently experienced bad performance. Regarding the coefficients related to the public information variables, there is evidence that the high rated-portfolio is more exposed to companies with a good past performance than low-rated portfolio.

Concerning the Wald tests, the time-varying betas and alphas and betas were relevant to most models. The adjusted R^2 improved slightly regarding all portfolios, giving more robustness to the results.

Table 10 - Conditional Carhart (1997) four-factor model – 30% cut-off - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0,006*	0.003	0,003*	0,006*	0,007**	-0.001
α_{ST}	-0,047**	-0,060***	0.013	-0.012	-0,024**	0.012
α_{DY}	0.008	0.004	0.004	-0.006	-0.006	-0.001
β_P	1,169***	1,112***	0.057	1,087***	0.991	0,096***
β_{ST*mkt}	0,535*	0.541	-0.006	0.334	0.326	0.009
β_{DYmkt}	0,430***	0.365	0.066	0.072	0.119	-0.046
β_{SMB}	0,253**	0,483***	-0,230**	0.055	0,328**	-0.273
β_{ST*SMB}	0.670	0.613	0.057	0.266	-0.192	0.458
β_{DY*SMB}	-0.142	0.543	-0,686***	0,403**	0,692**	-0.290
β_{HML}	-0.108	-0.117	0.009	-0.003	0.003	-0.007
β_{ST*HML}	0.531	1.156	-0.625	-0.132	1,112**	-1,244***
β_{DY*HML}	0.103	0.521	-0.418	0.111	0.660	-0.549
β_{MOM}	-0,202*	-0.187	-0.014	-0.053	-0.110	0.057
β_{STMOM}	0.489	0.346	0.143	0.309	-0.241	0,550**
β_{DY*MOM}	0.156	-0.454	0,610***	0.191	-0.244	0,435**
ω_1	0.085	0.181	0.731	0.480	0.542	0.848
ω_2	0.027	0.048	0.078	0.161	0.095	0.091
ω_3	0.001	0.006	0.121	0.024	0.010	0.085
$AdjR^2$	0.899	0.788	0.111	0.944	0.841	0.140

This table provides results for the conditional Carhart (1997) four-factor model with a 30% cut-off, using the FTSE EUROTOP 100 index as proxy of the market factor The. coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), and momentum (MOM), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*MOM}), (β_{DY*MOM}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

The second conditional model evaluated is the Fama and French (2015) five-factor model. Table 11 presents the results of this model using the MSCI Europe Index. Table 12 presents the results using the FTSE EUROTOP 100 Index.

Taking the adjusted R^2 in consideration, the conditional model improved in almost every model when comparing with the unconditional model. The increase means that this model explains better the performance of the portfolios than the other models, previously assessed. Only in Table 12, the value weighted portfolios suffered a decrease of explanatory power with the conditional model.

The statistically significant abnormal returns are more or less the same, having a positive value in Table 12, regarding both high and low-rated portfolios constructed via the value weighted method. There is evidence that these two portfolios outperform the market index. Regarding the time-varying alpha of the equally weighted high-rated portfolio, there is a negative and statistically significant coefficient associated to the short-term rate, meaning that in times of high short-term rates, this variable negatively affects the high-rated portfolio. Concerning the alpha associated to the dividend yield, it is only statistically significant in Table 11 in the value-weighted portfolios. The negative value in the high-rated portfolio means that in times of high dividend yield, the high-rated portfolio is negative affected by this.

The beta of the market is statistically significant, consistent with the results obtained previously. In relation to the betas of the public information variables, there is no statistically significant value regarding the short-term rate. Concerning the dividend yield, the coefficient is positive and statistically significant in most cases of an equally weighted portfolio (both in Table 11 and Table 12), meaning that in periods of high values of dividend yield, the companies from the portfolio are more exposed to both benchmarks.

Concerning the size factor (SMB), most coefficients present a positive and statistically significant coefficient, meaning that the portfolios are more exposed to small-cap stocks. Most coefficients related to the short-term rate are negative and statistically significant. This indicates that in times of a high short-term rates, the portfolio will be more exposed to big-cap stocks. Regarding the dividend yield, the coefficient is only positive and statistically significant in the case of value-weighted portfolios, and it is possible to conclude that in times of high value of the dividend yield, the value weighted portfolios will be more exposed to the small-cap stocks.

Regarding the book-to-market factor (HML), there are no statistically significant coefficients. Nevertheless, with the exception for the difference portfolios, the values are all negative, showing a slight possibility that the portfolios tend to be more exposed to low book-to-market firms. Concerning the short-term rate, in Table 12, both low-rated portfolios present a positive and statistical significant coefficient, meaning that low-rated portfolios are more exposed to high book-to-market firms in times of high short-term rate.

In respect to the profitability factor (RMW), there is only one positive and statistically significant coefficient, regarding the difference of the equally weighted portfolio of Table 12., which means that high-rated portfolios are more exposed to companies with robust profitability than low-rated portfolios. Regarding the conditional coefficients, in both Table 11 and Table 12, the low-rated equally weighted portfolio has a negative and statistically significant coefficient, meaning that in times of high short-term rate, the portfolios will be more exposed to companies with week profitability.

Concerning the investment risk factor (CMA), both in Table 11 and Table 12, the low rated portfolios of the value weighted have a positive and statistically significant value, meaning that low-rated value-weighted portfolios will be more exposed to companies with a conservative investment policy. Regarding the short-term rate, all coefficients from high and low-rated portfolios are statistically significant. When the coefficient is negative, the portfolio will be more exposed to an aggressive investment strategy, and when positive, are more exposed to conservative policies, *i.e.,* in times of high short-term rate.

In relation to the Wald tests results, in Table 11, regarding the equally weighted portfolios, it is notice that the betas, and alphas and betas are statistically significant at 1% level, proving the relevance of the Public Information Variables in these models. Concerning table 12, same conclusion as before in relation to equally weighted portfolios. In the value weighted, only alphas and betas together are statistically significant at 5% level.

Table 11 - Conditional Fama and French (2015) five-factor model (30% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.000	0.000	0.000	0.002	0.003	-0.002
α_{ST}	-0.033*	-0.039	0.007	0.007	-0.010	0.017
α_{DY}	0.003	0.007	-0.004	-0.0115*	0.003	-0.014
β_P	1.194*	1.147***	0.047	1.074***	1.016***	0.058
β_{ST*mkt}	-0.113	-0.239	0.126	-0.205	-0.055	-0.150
β_{DY*mkt}	0.372***	0.442**	-0.070	0.075	0.171*	-0.097
β_{SMB}	0.196	0.412***	-0.216*	0.059*	0.222*	-0.163
β_{ST*SMB}	0.533	-0.682	1.215***	-0.011	-0.843	0.832*
β_{DY*SMB}	0.308	0.514	-0.206	0.564**	0.403**	0.161
β_{HML}	-0.182	-0.135	-0.048	-0.043	-0.074	0.031
β_{ST*HML}	0.434	2.193*	-1.759***	-0.373	0.802	-1.175*
β_{DY*HML}	0.435	0.524	-0.089	0.178	0.592**	-0.414
β_{RMW}	0.001	-0.328	0.329	0.023	-0.121	0.144
β_{ST*RMW}	-0.198	-3.915**	3.717***	-0.713	-1.625	0.911
β_{DY*RMW}	0.543	-0.431	0.974	0.522	-1.163**	1.684***
β_{CMA}	0.073	0.173	-0.099	0.094*	0.312**	-0.218
β_{ST*CMA}	-1.405***	4.520***	-2.761**	1.652***	2.062***	-0.410
β_{DY*CMA}	1.758*	-1.148**	-0.257	-0.631*	-0.004	-0.627*
ω_1	0.292	0.412	0.884	0.234	0.881	0.360
ω_2	0.001	0.006	0.205	0.155	0.070	0.129
ω_3	0.000	0.005	0.266	0.214	0.063	0.122
$AdjR^2$	0.937	0.858	0.063	0.955	0.896	0.093

This table provides results for the conditional Fama and French (2015) five-factor model with a 30% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), profitability (RMW), investment (CMA), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*RMW}), (β_{DY*RMW}), (β_{ST*CMA}), (β_{DY*CMA}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 12 - Conditional Fama and French (2015) five-factor model (30% cut-off) FTSE EUROTOP 100 Index

	Equally Weighted			**Value Weighted**		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.005	0.005	0.000	0.006***	0.008**	-0.001
α_{ST}	-0.054**	-0.060	0.007	-0.011	-0.027	0.016
α_{DY}	0.008	0.011	-0.003	-0.007	0.006	-0.012
β_P	1.179***	1.107***	0.072	1.084***	0.996***	0.088
β_{ST*mkt}	0.116	-0.036	0.152	0.005	0.130	-0.125
β_{DY*mkt}	0.407***	0.486*	-0.079	0.067	0.189	-0.123
β_{SMB}	0.117	0.342*	-0.225**	-0.027	0.151	-0.178
β_{ST*SMB}	0.445	-0.784	1.229***	-0.085	-0.971*	0.886*
β_{DY*SMB}	0.275	0.439	-0.164	0.604***	0.395	0.209
β_{HML}	-0.136	-0.086	-0.050	-0.007	-0.033	0.026
β_{ST*HML}	1.235	2.953**	-1.719**	0.363	1.512**	-1.150*
β_{DY*HML}	0.533	0.639	-0.106	0.237	0.661	-0.423
β_{RMW}	-0.253	-0.572	0.319*	-0.184	-0.334	0.150
β_{ST*RMW}	-0.502	-4.223**	3.722***	-0.944	-1.966	1.021
β_{DY*RMW}	0.515	-0.373	0.888	0.486	-1.079	1.565***
β_{CMA}	0.173	0.268	-0.095	0.167	0.386**	-0.220
β_{ST*CMA}	2.181***	5.075***	-2.894***	1.824***	2.435***	-0.611
β_{DY*CMA}	-1.352***	-1.130**	-0.222	-0.583*	0.015	-0.598*
ω_1	0.109	0.242	0.923	0.551	0.559	0.424
ω_2	0.010	0.020	0.225	0.181	0.135	0.159
ω_3	0.001	0.005	0.291	0.058	0.035	0.167
$AdjR^2$	0.898	0.792	0.081	0.945	0.842	0.114

This table provides results for the conditional Fama and French (2015) five-factor model with a 30% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), profitability (RMW), investment (CMA), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*RMW}), (β_{DY*RMW}), (β_{ST*CMA}), (β_{DY*CMA}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

5.3 Robustness tests

As robustness tests, alternative cut-offs to form the portfolio will be used. The change in the cut-offs is motivated by the results of Kempf and Osthoff (2007) and will show the performance results of more stringent social strategies The cut-offs that are considered in this section are 20% and 10%.

5.3.1 Unconditional models

For a 20% cut-off, the results of the unconditional Carhart (1997) four-factor model regarding MSCI Europe Index and FTSE EUROTOP 100 Index are presented in Table 13 and Table 14, respectively. The results obtained lead, in general, to the same conclusions but with a high level of confidence. In the equally weighted portfolio, in both cut-offs, 20% and 30%, the difference portfolio presents a positive and statistically significant alpha, meaning that the high-rated portfolio outperforms the low-rated portfolio. Table 15 and Table 16 present the results obtained from portfolios formed on the 10% cut-off and the conclusions are similar. Yet, reducing the cut-off to 10% results in a greater statistically significance regarding the outperformance of the high-rated portfolio relative to the low-rated portfolio. In the case of the value weighted portfolio, the high-rated portfolio even presents a positive and statistically significant alpha, reinforcing the idea that investing in this portfolio could likely result in profit to the investor. These results are consistent with Kempf and Osthoff (2007), who only find a significant outperformance of high-rated portfolios when using extreme social ratings (10% cut-off).

Table 13 - Unconditional Carhart (1997) four-factor model (20% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.003	-0.007**	0.010***	0.002	-0.001	0.003
β_P	1.228***	1.182***	0.046	1.068***	1.062***	0.005
β_{SMB}	0.091	0.555***	-0.463***	0.073	0.399**	-0.326*
β_{HML}	-0.158	0.035	-0.193	-0.019	0.122	-0.141
β_{MOM}	-0.099	-0.085	-0.014	0.010	-0.050	0.060
Adj. R^2	0.919	0.831	0.070	0.945	0.847	0.005

This table provides results for the unconditional Carhart (1997) four-factor model with a 20% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 14 - Unconditional Carhart (1997) four-factor model (20% cut-off)- FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.005	-0.004	0.010***	0.005**	0.002	0.003
β_P	1.225***	1.151***	0.073	1.082***	1.037***	0.045
β_{SMB}	0.129	0.587***	-0.458***	0.109	0.429*	-0.320*
β_{HML}	-0.131	0.064	-0.195	0.003	0.148	-0.145
β_{MOM}	-0.173	-0.159	-0.014	-0.053	-0.117	0.064
Adj. R^2	0.880	0.759	0.084	0.937	0.777	0.014

This table provides results for the unconditional Carhart (1997) four-factor model with a 20% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 15 - Unconditional Carhart (1997) four-factor model (10% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.004	-0.007*	0.011***	0.001	0.000	0.001
β_P	1.205***	1.195***	0.009	1.036***	1.002***	0.034
β_{SMB}	0.093	0.518**	-0.425**	0.181	0.433*	-0.252
β_{HML}	-0.101	0.057	-0.157	0.022	0.218	-0.196
β_{MOM}	-0.144	-0.111	-0.033	-0.003	-0.138	0.135
Adj. R^2	0.915	0.811	0.026	0.930	0.783	-0.001

This table provides results for the unconditional Carhart (1997) four-factor model with a 10% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 16 - Unconditional Carhart (1997) four-factor model (10% cut-off)- FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.007*	-0.004	0.011***	0.003	0.002	0.000
β_P	1.202***	1.160***	0.042	1.049***	0.980***	0.069
β_{SMB}	0.131	0.551**	-0.420**	0.215	0.461*	-0.246
β_{HML}	-0.074	0.086	-0.160	0.043	0.243	-0.199
β_{MOM}	-0.217	-0.187	-0.030	-0.064	-0.201	0.137
Adj. R^2	0.879	0.736	0.032	0.921	0.722	0.009

This table provides results for the unconditional Carhart (1997) four-factor model with a 10% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

In respect to the Fama and French (2015) five-factor model, the cut-off of 20% also contributes to a lower performance regarding the low-rated portfolio. Table 17 and Table 18 present the results of these regressions using the different indexes as the market factor. There is evidence that, in the context of a 20% cut-off, the low-rated equally weighted portfolio underperforms the market. Table 19 and Table 20 present the results of this model considering the10% cut-off scenario. We observe that there is statistically significant evidence concerning the alpha of the difference portfolio on the equally weighted side. This abnormal return leads to the conclusion that, once more, the high-rated portfolio outperforms the low-rated one.

Table 17 - Unconditional Fama and French (2015) five-factor model (20% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	-0.001	-0.007**	0.006	0.002	0.000	0.002
β_P	1.236***	1.182***	0.054	1.068***	1.058***	0.009
β_{SMB}	0.081	0.409**	-0.328***	0.063	0.133	-0.070
β_{HML}	-0.308*	0.003	-0.311*	-0.070	0.040	-0.110
β_{RMW}	0.179	-0.209	0.388	0.004	-0.318	0.322
β_{CMA}	0.189	0.354	-0.365	0.203	0.719***	-0.516**
Adj. R^2	0.919	0.830	0.065	0.946	0.857	0.023

This table provides results for the unconditional Fama and French (2015) five-factor model with a 20% cut-off, using the MSCI Europe Index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; RMW - profitability and CMA – Investment, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 18 - Unconditional Fama and French (2015) five-factor model (20% cut-off) - FTSE EUROTOP 100 INDEX

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.003	-0.003	0.006*	0.005**	0.004	0.001
β_P	1.229***	1.151***	0.078	1.082***	1.036***	0.046
β_{SMB}	-0.020	0.309	-0.329***	-0.021	0.044	-0.065
β_{HML}	-0.246	0.066	-0.312*	-0.019	0.096	-0.116
β_{RMW}	-0.129	-0.509	0.380	-0.257*	-0.585**	0.328
β_{CMA}	0.408**	0.563**	-0.155	0.392***	0.906***	-0.514*
Adj. R^2	0.878	0.760	0.080	0.941	0.794	0.031

This table provides results for the unconditional Fama and French (2015) five-factor model with a 20% cut-off, using the FTSE EUROTOP 100 Index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; RMW - profitability and CMA – Investment, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 19 - Unconditional Fama and French (2015) five-factor model (10% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.000	-0.008**	0.008*	0.000	0.000	0.000
β_P	1.212***	1.196***	0.016	1.037***	1.001***	0.036
β_{SMB}	0.059	0.341*	-0.283**	0.170	0.163	0.007
β_{HML}	-0.246*	-0.018	-0.228	-0.029	0.136	-0.165
β_{RMW}	0.119	-0.203	0.321	0.013	-0.377	0.391
β_{CMA}	0.203	0.466*	-0.264	0.181	0.704**	-0.524*
Adj. R^2	0.913	0.811	0.021	0.932	0.790	0.007

This table provides results for the unconditional Fama and French (2015) five-factor model with a 10% cut-off, using the MSCI Europe Index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; RMW - profitability and CMA – Investment, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 20 - Unconditional Fama and French (2015) five-factor model (10% cut-off)- FTSE EUROTOP 100 INDEX

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.004	-0.004	0.008**	0.003	0.003	0.000
β_P	1.207	1.161***	0.046	1.050***	0.981***	0.069
β_{SMB}	-0.040	0.239	-0.279**	0.089	0.079	0.009
β_{HML}	-0.185	0.047	-0.232	0.021	0.189	-0.168
β_{RMW}	-0.183	-0.507	0.324	-0.241	-0.630**	0.389
β_{CMA}	0.418**	0.678**	-0.260	0.365**	0.882***	-0.517
Adj. R^2	0.875	0.738	0.027	0.924	0.734	0.017

This table provides results for the unconditional Fama and French (2015) five-factor model with a 10% cut-off, using the FTSE EUROTOP 100 Index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; RMW - profitability and CMA – Investment, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

5.3.2 Conditional models

The results obtained from the conditional Carhart (1997) four-factor model with a 20% cut-off are presented in Table 21 and Table 22. Comparing these abnormal returns and the abnormal returns obtained previously on this section for the 30% cut-off scenario, there is no evidence of a higher performance by neither portfolio. Yet, there are some changes regarding the significance level of the already statistically significant coefficients. For example, using the FTSE EUROTOP Index the significance level of the abnormal return of the value-weighted high-rated portfolio improves from 10% to 1%.

Concerning the 10% cut-off, the results are presented in Table 23 and Table 24. We observe that there is an improvement regarding the low-rated portfolio. Using both methods, the alphas improved in the case of 10% cut-off and the significance level of the abnormal return of the value weighted portfolio improves from the 10% level to the 1% level.

Table 21 - Conditional Carhart (1997) four-factor model (20% cut-off) - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.004	-0.004	0.007**	0.002	0.002	0.000
α_{ST}	-0.019	-0.035	0.015	0.012	-0.011	0.023
α_{DY}	0.011	0.004	0.007	-0.009	-0.008	-0.001
β_P	1.196***	1.156***	0.040	1.066***	1.060***	0.006
β_{ST*mkt}	0.153	0.034	0.119	0.032	0.006	0.026
β_{DY*mkt}	0.397***	0.270	0.127	0.064	0.069	-0.006
β_{SMB}	0.212**	0.556***	-0.344**	0.059	0.303*	-0.244
β_{ST*SMB}	0.743	0.494	0.249	0.360	0.442	-0.082
β_{DY*SMB}	-0.335	0.324	-0.659**	0.271	0.581	-0.310
β_{HML}	-0.224*	-0.077	-0.147	-0.018	0.018	-0.035
β_{ST*HML}	-0.144	0.399	-0.513	-0.789**	0.457	-1.246
β_{DY*HML}	-0.307	0.474	-0.781**	-0.068	0.813**	-0.882**
β_{MOM}	-0.104	-0.109	0.005	0.022	-0.059	0.081
β_{ST*MOM}	0.330	0.149	0.181	0.224	-0.203	0.428
β_{DY*MOM}	0.277	-0.488965*	0.766***	0.280*	-0.304	0.584**
ω_1	0.299	0.465	0.683	0.301	0.716	0.675
ω_2	0.025	0.140	0.150	0.343	0.256	0.192
ω_3	0.001	0.059	0.126	0.360	0.095	0.103
$AdjR^2$	0.928	0.843	0.114	0.946	0.856	0.058

This table provides results for the conditional Carhart (1997) four-factor model with a 20% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), and momentum (MOM), the conditional betas $(\beta_{ST*mkt}), (\beta_{DY*mkt}), (\beta_{ST*SMB}), (\beta_{DY*SMB}), (\beta_{ST*HML}), (\beta_{DY*HML}), (\beta_{ST*MOM}), (\beta_{DY*MOM})$ and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%

Table 22 - Conditional Carhart (1997) four-factor model (20% cut-off) - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.008**	0.000	0.007**	0.006***	0.006*	0.000
α_{ST}	-0.040**	-0.055***	0.015	-0.007	-0.031**	0.023
α_{DY}	0.013	0.005	0.008	-0.007	-0.007	0.000
β_P	1.182	1.118***	0.065	1.076***	1.031***	0.046
β_{ST*mkt}	0.543*	0.452	0.090	0.355**	0.377	-0.022
β_{DYmkt}	0.427***	0.295	0.132	0.050	0.090	-0.040
β_{SMB}	0.227**	0.564***	-0.337**	0.044	0.302*	-0.258
β_{ST*SMB}	0.463	0.129	0.335	0.093	0.102	-0.009
β_{DY*SMB}	-0.193	0.421	-0.614**	0.456**	0.685*	-0.229
β_{HML}	-0.203	-0.053	-0.150	-0.007	0.034	-0.041
β_{ST*HML}	0.435	0.923	-0.488	-0.271	0.901	-1.172*
β_{DY*HML}	-0.102	0.683	-0.785**	0.060	0.975*	-0.915**
β_{MOM}	-0.186*	-0.190	0.004	-0.044	-0.130	0.086
β_{STMOM}	0.510	0.371	0.139	0.385	0.023	0.361
β_{DY*MOM}	0.220	-0.524	0.744***	0.235	-0.320	0.556**
ω_1	0.102	0.246	0.644	0.539	0.491	0.664
ω_2	0.066	0.134	0.152	0.109	0.135	0.183
ω_3	0.001	0.012	0.123	0.014	0.010	0.106
$AdjR^2$	0.899	0.786	0.128	0.944	0.803	0.065

This table provides results for the conditional Carhart (1997) four-factor model with a 20% cut-off, using the FTSE EUROTOP 100 Index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), and momentum (MOM), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*MOM}), (β_{DY*MOM}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%

Table 23 - Conditional Carhart (1997) four-factor model (10% cut-off)- MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.004	-0.004	0.008***	0.000	0.003	-0.003
α_{ST}	-0.010	-0.038**	0.027	0.009	-0.016	0.025*
α_{DY}	0.009	0.003	0.006	-0.002***	-0.005	-0.012
β_P	1.169***	1.161***	0.008	1.036***	1.014***	0.022
β_{ST*mkt}	0.157	0.289	-0.131	0.012	-0.144	0.156
β_{DY*mkt}	0.411***	0.389*	0.022	0.039	0.100	-0.061
β_{SMB}	0.218**	0.520***	-0.302*	0.015*	0.031**	-0.158
β_{ST*SMB}	0.778	0.620**	-0.319	0.990**	1.129**	-0.139
β_{DY*SMB}	-0.288	1.097**	0.908***	0.045**	0.998***	-0.596
β_{HML}	-0.145	-0.050	-0.094	0.032	0.114	-0.083
β_{ST*HML}	-0.838*	0.180	-1.018	-0.926**	-0.313	-0.6132
β_{DY*HML}	-0.422	0.255	-0.678	0.050**	0.549	-0.504
β_{MOM}	-0.143	-0.116	-0.027	0.023	-0.132	0.155
β_{ST*MOM}	0.581	0.416	0.165	0.288	0.183	0.104
β_{DY*MOM}	0.387*	-0.407	0.794***	0.328**	-0.370	0.699**
ω_1	0.537	0.454	0.551	0.042	0.791	0.518
ω_2	0.015	0.034	0.059	0.026	0.286	0.411
ω_3	0.006	0.014	0.086	0.015	0.075	0.068
$AdjR^2$	0.926	0.831	0.084	0.938	0.797	0.064

This table provides results for the conditional Carhart (1997) four-factor model with a 10% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), and momentum (MOM), the conditional betas $(\beta_{ST*mkt}), (\beta_{DY*mkt}), (\beta_{ST*SMB}), (\beta_{DY*SMB}), (\beta_{ST*HML}), (\beta_{DY*HML}), (\beta_{ST*MOM}), (\beta_{DY*MOM})$ and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%

Table 24 - Conditional Carhart (1997) four-factor model (10% cut-off) - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.008**	0.000	0.008***	0.004*	0.007*	-0.003
α_{ST}	-0.031*	-0.059***	0.028	-0.009	-0.034*	0.025*
α_{DY}	0.011	0.004	0.007	-0.015**	-0.005	-0.011
β_P	1.156***	1.119***	0.037	1.042***	0.987***	0.054
β_{ST*mkt}	0.549**	0.729*	-0.179	0.324*	0.188	0.136
β_{DYmkt}	0.441***	0.442*	-0.001	0.047	0.144	-0.097
β_{SMB}	0.234	0.544***	-0.310	0.143	0.318*	-0.175
β_{ST*SMB}	0.492	0.725	-0.233	0.742	0.868	-0.126
β_{DY*SMB}	-0.148	0.710**	-0.858***	0.565	1.081***	-0.516
β_{HML}	-0.123	-0.026	-0.098	0.040	0.127	-0.087
β_{ST*HML}	-0.265	0.695	-0.959	-0.460	0.088	-0.54828
β_{DY*HML}	-0.223	0.483	-0.706	0.162	0.690	-0.527
β_{MOM}	-0.223**	-0.199	-0.024	-0.041	-0.200	0.159*
β_{STMOM}	0.755	0.643	0.111	0.465*	0.404	0.061
β_{DY*MOM}	0.331	-0.442	0.773***	0.299**	-0.376	0.675**
ω_1	0.229	0.242	0.514	0.095	0.531	0.544
ω_2	0.067	0.028	0.064	0.007	0.195	0.411
ω_3	0.001	0.003	0.094	0.005	0.010	0.077
$AdjR^2$	0.899	0.774	0.087	0.931	0.754	0.071

This table provides results for the conditional Carhart (1997) four-factor model with a 10% cut-off, using the FTSE EUROTOP 100 Index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), and momentum (MOM), the conditional betas $(\beta_{ST*mkt}), (\beta_{DY*mkt}), (\beta_{ST*SMB}), (\beta_{DY*SMB}), (\beta_{ST*HML}), (\beta_{DY*HML}), (\beta_{ST*MOM}), (\beta_{DY*MOM})$ and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%

Table 25 and Table 26 present the results obtained by using the conditional Fama and French (2015) five-factor model, with the MSCI Europe Index and the FTSE EUROTOP 100 Index, respectively, as the market factor. In Table 26, the top-rated value weighted portfolio, with 20% cut-off, presents a positive and statistically significant alpha (at the 1% level), meaning that can be inferred that, with 99% of certainty, that it would outperforms the market, providing a positive abnormal return. Regarding Table 25, there is no significant change in the abnormal returns of the portfolios relative to either the market or between them.

Concerning the cut-off of 10%, the results are presented in Table 27 and Table 28. As can be observed, there are statistically significant changes in both tables. In Table 27, the alpha of the value-weighted low-rated portfolio is positive and statistically significant at the 5% level, meaning that the low-rated portfolio outperforms the market. In the difference portfolio, there is a negative and statistically significant alpha that indicates that high-rated portfolio underperforms the low-rated portfolio. In Table 28, the low rated portfolio reinforces the statistically significance level of its alpha from 5% to 1%, and now the difference portfolio shows a negative and statistically significant coefficient

Table 25 - Conditional Fama and French (2015) five-factor model (20% cut-off)- MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.001	-0.002	0.003	0.002	0.004	-0.002
α_{ST}	-0.020	-0.049	0.029	0.014	-0.018	0.033*
α_{DY}	0.005	0.009	-0.003	-0.014**	0.005	-0.019
β_P	1.201***	1.150***	0.051	1.058***	1.071***	-0.013
β_{ST*mkt}	-0.109	-0.193	0.084	-0.183	-0.238	0.055
β_{DY*mkt}	0.364***	0.379*	-0.015	0.049	0.137	-0.088
β_{SMB}	0.178	0.441***	4-0.263*	0.049	0.101	-0.052
β_{ST*SMB}	0.366	-0.826	1.192	-0.093	-0.799	0.706
β_{DY*SMB}	0.317	0.318	0.000	0.634***	0.412*	0.215
β_{HML}	-0.283*	-0.077	-0.206	-0.042	-0.062	0.019
β_{ST*HML}	0.416	1.149	-0.733	-0.495	0.921	-1.416
β_{DY*HML}	0.229	0.613	-0.384	0.100	0.930**	-0.830**
β_{RMW}	0.014	-0.351	0.365	0.010	-0.313	0.323
β_{ST*RMW}	-0.270	-2.049	1.779	-0.582	-2.486	1.905
β_{DY*RMW}	0.783	-0.546	1.329*	0.732**	-1.412**	2.144***
β_{CMA}	0.139	0.221	-0.082	0.213	0.517***	-0.395**
β_{ST*CMA}	1.287	4.372***	-3.085**	1.325*	3.649***	-2.327*
β_{DY*CMA}	-1.481***	-1.001**	-0.471	-0.614	-0.278	-0.336
ω_1	0.569	0.285	0.583	0.126	0.724	0.213
ω_2	0.003	0.041	0.512	0.234	0.058	0.126
ω_3	0.002	0.027	0.418	0.284	0.040	0.097
$AdjR^2$	0.933	0.847	0.692	0.948	0.870	0.083

This table provides results for the conditional Fama and French (2015) five-factor model with a 20% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), profitability (RMW), investment (CMA), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*RMW}), (β_{DY*RMW}), (β_{ST*CMA}), (β_{DY*CMA}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 26 - Conditional Fama and French (2015) five-factor model (20% cut-off)- FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.006*	0.003	0.003	0.006***	0.009**	-0.003
α_{ST}	-0.041*	-0.070*	0.029	-0.003	-0.036	0.033*
α_{DY}	0.011	0.012	-0.002	-0.009	0.008	-0.017
β_P	1.190***	1.113***	0.076	1.072***	1.043***	0.030
β_{ST*mkt}	0.114	0.035	0.079	0.028	-0.040	0.068
β_{DY*mkt}	0.402***	0.416	-0.014	0.040	0.179	-0.138
β_{SMB}	0.099	0.368*	-0.268*	-0.037	0.033	-0.070
β_{ST*SMB}	0.287	-0.946	1.233**	-0.164	-0.931*	0.767
β_{DY*SMB}	0.288	0.260	0.028	0.683***	0.410	0.273
β_{HML}	-0.237	-0.029	-0.208	-0.008	-0.017	0.009
β_{ST*HML}	1.229	1.904	-0.676	0.231	1.651*	-1.42065
β_{DY*HML}	0.324	0.718	-0.394	0.153	0.988**	-0.835**
β_{RMW}	-0.244	-0.592	0.348	-0.195	-0.546*	0.351
β_{ST*RMW}	-0.606	-2.310	1.705	-0.808	-2.842	2.034
β_{DY*RMW}	0.742	-0.479	1.222*	0.687*	-1.267	1.953***
β_{CMA}	0.240	0.313	-0.072	0.193	0.597***	-0.403**
β_{ST*CMA}	1.714*	4.847***	-3.133**	1.459**	4.040***	-2.580**
β_{DY*CMA}	-1.426**	-0.986*	-0.440	-0.562	-0.292	-0.270
ω_1	0.205	0.162	0.599	0.488	0.452	0.254
ω_2	0.021	0.090	0.544	0.200	0.094	0.132
ω_3	0.001	0.019	0.435	0.060	0.019	0.108
$AdjR^2$	0.900	0.786	0.082	0.945	0.816	0.087

This table provides results for the conditional Fama and French (2015) five-factor model with a 20% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), profitability (RMW), investment (CMA), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*RMW}), (β_{DY*RMW}), (β_{ST*CMA}), (β_{DY*CMA}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 27 - Conditional Fama and French (2015) five-factor model (10% cut-off)- MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.002	-0.002	0.004	-0.001	0.005**	-0.006*
α_{ST}	-0.015	-0.041	0.026	0.023*	-0.029*	0.051***
α_{DY}	0.003	0.002	0.001	-0.024***	0.007	-0.031**
β_P	1.181***	1.144***	0.037	1.026***	1.030***	-0.004
β_{ST*mkt}	-0.126	-0.116	-0.010	-0.245	-0.403*	0.158
β_{DY*mkt}	0.340***	0.515*	-0.174	0.022	0.161	-0.139
β_{SMB}	0.121	0.420***	-0.299*	0.171**	0.058	0.113
β_{ST*SMB}	0.726	-0.510	1.237**	0.412	0.259	0.153
β_{DY*SMB}	0.373	0.653**	-0.280	0.758***	0.671**	0.087
β_{HML}	-0.204	-0.036	-0.169	0.226	0.573	-0.035
β_{ST*HML}	-0.577	1.601	-2.177*	-0.247	-0.053	-0.194
β_{DY*HML}	0.053	0.270	-0.217	0.193	0.398	-0.206
β_{RMW}	-0.047	-0.424	0.376	0.019	-0.464	0.483
β_{ST*RMW}	0.828	-3.313**	4.141***	-1.330	-1.501	0.170
β_{DY*RMW}	1.026*	0.209	0.816	0.927***	-1.132*	2.060***
β_{CMA}	0.157	0.247	-0.091	0.684	0.482*	-0.414*
β_{ST*CMA}	1.074	4.951***	-3.876**	1.092	3.791***	-2.699
β_{DY*CMA}	-1.336**	-1.145**	-0.191	-0.520	0.115	-0.635
ω_1	0.773	0.510	0.740	0.004	0.625	0.069
ω_2	0.011	0.013	0.236	0.034	0.204	0.304
ω_3	0.005	0.009	0.290	0.018	0.102	0.092
$AdjR^2$	0.926	0.835	0.041	0.939	0.803	0.069

This table provides results for the conditional Fama and French (2015) five-factor model with a 10% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), profitability (RMW), investment (CMA), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*RMW}), (β_{DY*RMW}), (β_{ST*CMA}), (β_{DY*CMA}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 28 - Conditional Fama and French (2015) five-factor model (10% cut-off) - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.007*	0.003	0.004	0.004*	0.010***	-0.006**
α_{ST}	-0.035*	-0.062	0.027	0.006	-0.045**	0.051***
α_{DY}	0.008	0.007	0.002	-0.020***	0.009	-0.030**
β_P	1.169***	1.104***	0.066	1.035***	1.003***	0.033
β_{ST*mkt}	0.119	0.115	0.004	-0.059	-0.235	0.177
β_{DY*mkt}	0.380***	0.571*	-0.191	0.027	0.227*	-0.199
β_{SMB}	0.044	0.355**	-0.311*	0.092	0.000	0.092
β_{ST*SMB}	0.638	-0.619	1.257**	0.343	0.172	0.171
β_{DY*SMB}	0.349	0.568	-0.219	0.803	0.651	0.152
β_{HML}	-0.158	0.014	-0.173	0.057	0.100	-0.043
β_{ST*HML}	0.202	2.341**	-2.139**	0.466	0.644	-0.17801
β_{DY*HML}	0.141	0.386	-0.245	0.236	0.450	-0.214
β_{RMW}	-0.299	-0.674*	0.375	-0.188*	-0.699**	0.511*
β_{ST*RMW}	0.570	-3.574*	4.144***	-1.619	-1.887	0.268
β_{DY*RMW}	0.997	0.240	0.757	0.926**	-1.000	1.926***
β_{CMA}	0.256	0.349	-0.094	0.139	0.565***	-0.426*
β_{ST*CMA}	1.437	5.490***	-4.053***	1.277	4.217***	-2.940*
β_{DY*CMA}	-1.283**	-1.109**	-0.174	-0.492	0.081	-0.573
ω_1	0.338	0.306	0.727	0.053	0.400	0.077
ω_2	0.075	0.022	0.234	0.022	0.222	0.297
ω_3	0.005	0.005	0.289	0.019	0.038	0.099
$AdjR^2$	0.893	0.775	0.177	0.932	0.758	0.076

This table provides results for the conditional Fama and French (2015) five-factor model with a 10% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients concerning size (SMB), book-to-market (HML), profitability (RMW), investment (CMA), the conditional betas (β_{ST*mkt}), (β_{DY*mkt}), (β_{ST*SMB}), (β_{DY*SMB}), (β_{ST*HML}), (β_{DY*HML}), (β_{ST*RMW}), (β_{DY*RMW}), (β_{ST*CMA}), (β_{DY*CMA}) and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

5.4 Portfolio Performance in the Covid-19 crisis

To analyse the performance in the recession period, the Carhart (1997) four-factor model with a dummy variable was used.[7] These regressions were performed considering different cut-offs and both market indices as benchmarks.

[7] I only considered the Carhart (1997) four-factor model in this analysis due to the limited number of observations associated to the Covid-19 crisis. Anyhow, as shown before, the explanatory power of this model is satisfactory.

Table 29 and Table 30 presents the analysis considering a 30% cut-off. Regarding both tables, when not in recession, the portfolios behave as expected based on the previous studies. The high-rated portfolio has, in general, a superior performance when comparing to the market and the low-rated portfolio, particularly in the case of value-weighted portfolios, which show a positive statistically significant abnormal returns at a 1% level when compared to both market indices. In the recession period, the high-rated equally weighted portfolios do not change the performance, but in case of the MSCI Europe Index, the high-rated value-weighted portfolio decreases performance significantly. In relation to the market factor, when using the MSCI Europe Index, the beta of the high-rated portfolio increases significantly in the recession period. The results regarding the SMB factor implies that in recession, the low-rated portfolio exhibits a significant increase in the exposure to small-cap companies. Regarding the momentum factor, the exposure of the high-rated portfolio increases significantly in times of recession.

Table 29 - Carhart (1997) four-factor model (30% cut-off) with dummy variable recession - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.003	0.000	0.003*	0.003***	0.004	0.000
α_D	-0.016	-0.009	-0.007	-0.008***	-0.015	0.008
β_P	1.164***	1.133***	0.031	1.054***	0.989***	0.065
β_{SMB}	0.121	0.155	-0.033	0.076	0.160	-0.084
β_{HML}	-0.018	-0.108	0.089	-0.026	0.012	-0.038
β_{MOM}	-0.240***	-0.092	-0.148*	-0.042	-0.004	-0.038
β_{mkt*D}	0.202***	0.052	0.151***	0.128***	0.017	0.112*
β_{SMB*D}	0.400	1.124	-0.724**	0.017	0.926***	-0.909***
β_{HML*D}	-0.390	-0.202	-0.188*	0.060	0.034	0.026
β_{MOM*D}	0.677***	0.254	0.423***	0.183***	0.135	0.049
$AdjR^2$	0.9334	0.844	0.1851	0.954	0.889	0.087

This table provides results for the Carhart (1997) four-factor model with a dummy variable for the recession period and a 30% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 30 - Unconditional Carhart (1997) four-factor model (30% cut-off) with dummy variable recession - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.007*	0.004	0.003	0.007***	0.007**	0.000
α_D	-0.014	-0.007	-0.006	-0.005	-0.014	0.008*
β_P	1.151***	1.010***	0.052	1.064***	0.973***	0.091
β_{SMB}	0.025	0.056	-0.031	-0.008	0.077	-0.084
β_{HML}	-0.063	-0.151	0.087	-0.067	-0.026	-0.041
β_{MOM}	-0.303***	-0.159	-0.144*	-0.093	-0.059	-0.034
β_{mkt*D}	0.126*	-0.003	0.129**	0.043	-0.055	0.098
β_{SMB*D}	0.799	1.487*	-0.688**	0.361	1.236***	-0.875***
β_{HML*D}	-0.365	-0.179	-0.185*	0.085	0.050	0.035
β_{MOM*D}	0.770***	0.355*	0.415***	0.259***	0.228	0.032
$AdjR^2$	0.896	0.783	0.199	0.944	0.838	0.116

This table provides results for the Carhart (1997) four-factor model with a dummy variable for the recession period and a 30% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Aiming the different cut-offs, Table 31 and Table 32 present the results of the 20% cut-off and Table 33 and Table 34 present those of the 10% cut-off portfolios.

Focusing on Tables 31 and 32, portfolio performance does not seem to change in the recession period, except for the high-rated value-weighted portfolio when using the MSCI Europe index, which decreases performance significantly. Yet, when using the 10% cut-off (Table 33 and Table 34) there is no evidence of evidence of significant performance changes in the recession period.

In terms of the market factor, the high-rated portfolios tend to increase their exposure to market, as reflected in the statistical significance of the beta coefficient associated to the recession

Relatively to the size factor, low-rated portfolios tend to be more exposed to small cap firms in the Covid recession, regardless of the cut-off used.

Regarding the book-to-market factor, it seems that after outbreak of the Covid-19 crisis, the equally weighted high-rated portfolios tend to increase their exposure to low book-to-market companies (value companies).

From Tables 31 to Table 34, it is notorious, in the recession period, the higher exposure of equally weighted high-rated portfolios to firms that recently presented gains.

Table 31 - Carhart (1997) four-factor model (20% cut-off) with dummy variable recession - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.004	-0.005	0.009***	0.003*	0.003	0.000
α_D	-0.013	-0.004	-0.009	-0.007***	-0.022	0.015
β_P	1.161***	1.157***	0.004	1.040***	1.041***	-0.001
β_{SMB}	0.111	0.307	-0.195	0.082	0.129	-0.047
β_{HML}	-0.097	0.005	-0.101	-0.038	0.044	-0.082
β_{MOM}	-0.247***	-0.076	-0.170*	-0.032	-0.030	-0.003
β_{mkt*D}	0.246***	-0.025	0.271***	0.142***	0.018	0.124*
β_{SMB*D}	0.335	1.010	-0.675	-0.029	1.165***	-1.194***
β_{HML*D}	-0.544**	-0.378	-0.166	0.089	0.019	0.070
β_{MOM*D}	0.717***	0.241	0.476***	0.118	0.195	-0.077
$AdjR^2$	0.934	0.834	0.170	0.946	0.852	0.032

This table provides results for the Carhart (1997) four-factor model with a dummy variable for the recession period and a 20% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 32 - Carhart (1997) four-factor model (20% cut-off) with dummy variable recession - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.009**	0.000	0.009***	0.007***	0.007**	0.000
α_D	-0.011	-0.003	-0.008	-0.005	-0.021	0.016
β_P	1.151***	1.127***	0.024	1.054***	1.019***	0.035
β_{SMB}	0.016	0.207	-0.191	0.001	0.040	-0.039
β_{HML}	-0.141	-0.039	-0.102	-0.078	0.004	-0.083
β_{MOM}	-0.308***	-0.143	-0.165*	-0.082	-0.088	0.007
β_{mkt*D}	0.168**	-0.086	0.254***	0.054	-0.060	0.114
β_{SMB*D}	0.741*	1.364*	-0.623	0.312	1.494***	-1.182***
β_{HML*D}	-0.518	-0.355	-0.162	0.114	0.034	0.081
β_{MOM*D}	0.807***	0.344*	0.463***	0.191**	0.300	-0.108
$AdjR^2$	0.901	0.776	0.180	0.942	0.794	0.042

This table provides results for the Carhart (1997) four-factor model with a dummy variable for the recession period and a 20% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 33 - Carhart (1997) four-factor model (10% cut-off) with dummy variable recession - MSCI Europe Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.005	-0.003	0.008**	0.002	0.004	-0.002
α_D	-0.006	-0.011	0.004	-0.010	-0.016	0.005
β_P	1.136***	1.146***	-0.010	1.006***	0.966***	0.041
β_{SMB}	0.150	0.151	-0.001	0.187	0.169	0.018
β_{HML}	-0.028	-0.025	-0.003	0.002	0.148	-0.146
β_{MOM}	-0.291***	-0.094	-0.197**	-0.042	-0.118	0.075
β_{mkt*D}	0.270***	0.090	0.180**	0.181***	0.130	0.051
β_{SMB*D}	0.099	1.359*	-1.261**	-0.012	0.989*	-1.001**
β_{HML*D}	-0.555***	-0.262	-0.293	0.143	-0.013	0.156
β_{MOM*D}	0.628***	0.203	0.425***	0.080	0.063	0.016
$AdjR^2$	0.931	0.822	0.131	0.932	0.785	-0.003

This table provides results for the Carhart (1997) four-factor model with a dummy variable for the recession period and a 10% cut-off, using the MSCI Europe index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

Table 34 - Carhart (1997) four-factor model (10% cut-off) with dummy variable recession - FTSE EUROTOP 100 Index

	Equally Weighted			Value Weighted		
Portfolio	High-Rated	Low-Rated	Difference	High-Rated	Low-Rated	Difference
α_P	0.009**	0.002	0.007**	0.005**	0.007*	-0.002
α_D	-0.004	-0.009	0.006	-0.008	-0.014	0.006
β_P	1.128***	1.112***	0.016	1.018***	0.946***	0.072
β_{SMB}	0.057	0.051	0.005	0.108	0.087	0.021
β_{HML}	-0.072	-0.069	-0.003	-0.037	0.111	-0.149
β_{MOM}	-0.351***	-0.161	-0.190**	-0.090	-0.172	0.081
β_{mkt*D}	0.189***	0.032	0.157**	0.092*	0.047	0.045
β_{SMB*D}	0.502	1.734*	-1.232**	0.329	1.320*	-0.991**
β_{HML*D}	-0.530***	-0.240	-0.290	0.166	-0.002	0.168
β_{MOM*D}	0.717***	0.305	0.412***	0.154	0.164	-0.011
$AdjR^2$	0.900	0.764	0.134	0.924	0.735	0.008

This table provides results for the Carhart (1997) four-factor model with a dummy variable for the recession period and a 10% cut-off, using the FTSE EUROTOP 100 index as proxy of the market. The coefficients presented in the table are the abnormal return (α_p), the systematic risk (β_p), the regression coefficients regarding SMB – return difference between small and large capitalization portfolio; regarding HML – return difference between a high and a low boot-to-market portfolio; and regarding MOM – return difference between portfolios of portfolios with high and low returns over the past 12 months, and the adjusted coefficient of determination ($adjR^2$).The standard errors were corrected for heteroskedasticity and autocorrelation following Newey-West (1987). The statistical significance of the coefficients is represented by (*) for a significance of 10%, (**) for 5% and (***) for 1%.

6. Conclusions

This study analyses the financial performance of European companies screened by social criteria, as measured by the Social dimension of the Thomson Reuters ESG Refinitiv scores. The time of the analysis is from June 2011 until May 2021.Equally and value-weighted portfolios of the top 30% and worst 30% of companies were formed, and to evaluate performance, the Carhart (1997) four-factor model and the Fama and French (2015) five-factor model were used, both in the unconditional and conditional forms.

Analysing the results, it is possible to take some conclusions. Regarding the portfolio formed with the 30% high and low-rated companies, the high-rated portfolio formed using the value weighted method has a positive and statistically significant alpha, indicating it outperforms, whatever model used, the FTSE EUROTOP 100 index. The adjusted R^2 improves when using the conditional models, as expected, supporting the robustness of the conditional approach to evaluating performance. In relation to the low-rated portfolio, it has a negative performance when using the equally weighted method, when comparing to the top-rated portfolio, but the alphas are neutral when portfolios formed by the value weighted method.

For robustness purposes, alternative cut-offs of 20% and 10% were used to form portfolios. Evaluating the portfolios with the 20% cut-off, regarding the value weighted formation, the high-rated portfolio has a positive and statistically significant alpha, and the low-rated portfolio outperforms the market when using conditional models. Accounting for the equally weighted portfolios, the difference portfolio often presents a positive and statistically significant alpha, meaning that the high-rated portfolio outperforms the low-rated. Concerning all models, the high-rated portfolio presents only once a negative alpha, but 15 out of 16 models implemented, it presents a positive abnormal return, in which six are statistically significant. Lastly, the use of conditional models improved the adjusted R^2 compared to other models.

Relatively to the portfolios with a 10% cut-off, the results lead to different conclusions. Regarding the equally weighted portfolio, the low-rated portfolio has six negative alphas, with two of them being statistically significant, concluding that they underperform both indices. When assessing the behaviour of the low-rated portfolio using the value weighted method, seven out of eight alphas are positive and one of the three are statistically significant at the 1% level - it is the only time that low-rated portfolio outperforms the high-rated with significance at 5% level. The adjusted R^2 demonstrates improvements when using the conditional model.

Regarding the recession period analysis, it seems that portfolios' performance is resilient to the Covid-19 recession, particularly for portfolios that are formed with more stringent cut-offs. Nevertheless, there are some changes in portfolios' exposure to several risk factors in the recession period.

To conclude, it is possible to infer that the high-rated portfolio frequently produces a positive and statistically significant alpha. Low and high-rated portfolios perform better when both were constructed based on the market value of the companies. The high-rated portfolio usually outperforms the low-rated portfolio. The last conclusion is that forming portfolios based on the Thomson Reuters Refinitiv ESG Social score can mean positive abnormal returns to the investor.

Future work needs to be done. As initially stated, more companies are being rated in ESG terms over time I recommend performing a new analysis with a reduced time-window. In the last three years, the number of companies presented in the Thomson Reuters ESG Refinitiv have stabilised and with less volatility in the data, the results may be more meaningful. Studying this topic from the last three to five years would be less exposed to the changes in the list constitution. One other future analysis could be to form portfolios based on the specific categories that compose the Social score of Thomson Reuters ESG Refinitiv, to assess whether specific issues within this pillar have a greater impact in financial investments than others.

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